Comparison of Black Carbon Determination by Evolved Gas Analysis and Optical Attenuation

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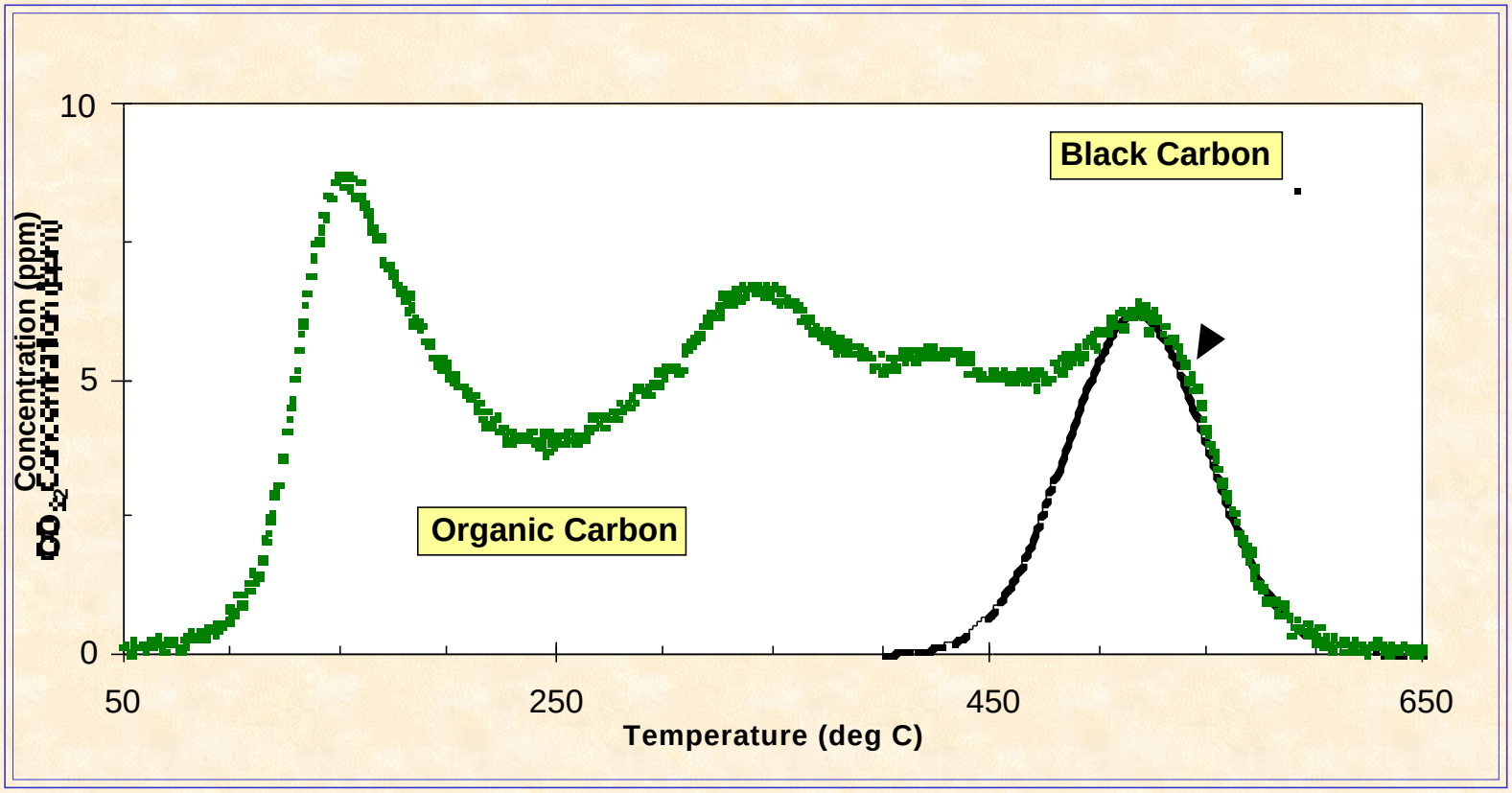
OBJECTIVES

- Determine BC after removing most of the OC by extraction with water and acetone.
- Compare ATN vs. Thermogram BC temperature peak.

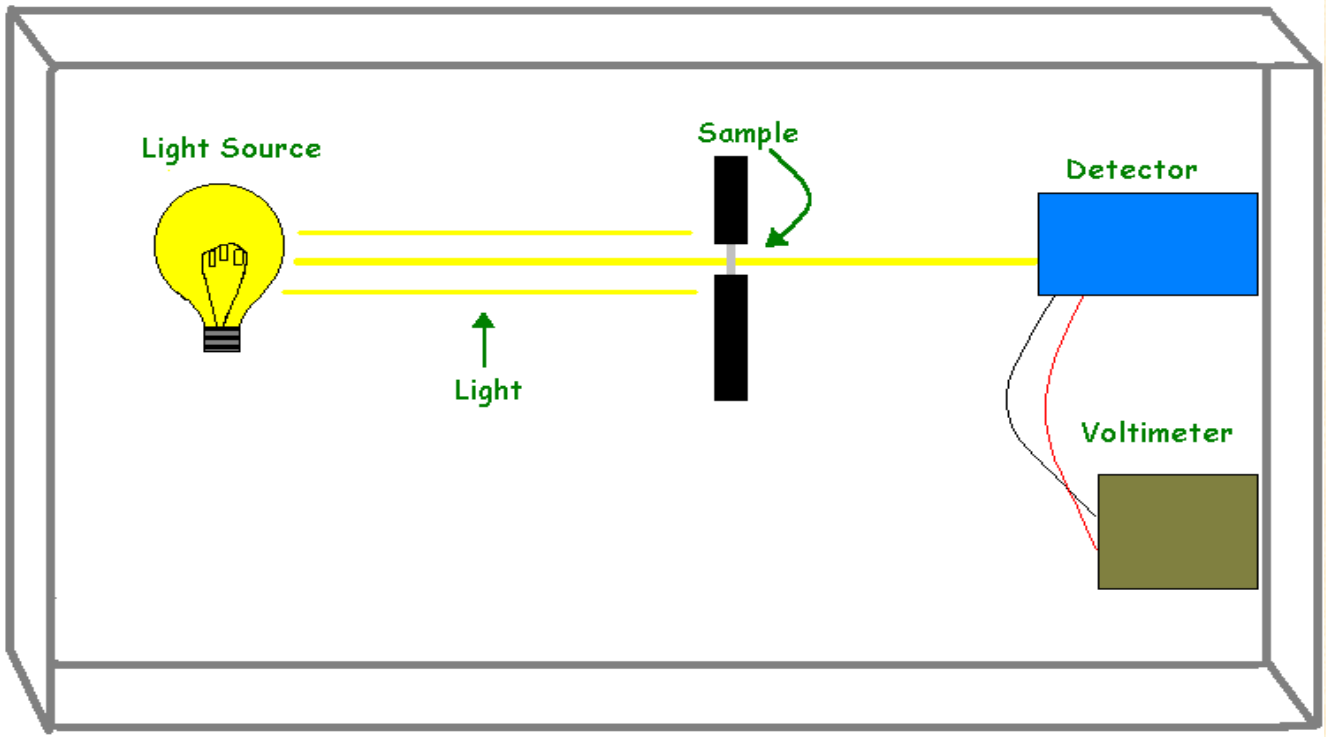
METHOD

- The carbonaceous material of untreated samples and of samples after extraction in water and acetone was characterized by Evolved Gas Analysis and Optical Attenuation.
- The extraction consisted of immersing 1.12 and 0.58cm^2 punches in 15mL of de-ionized water and acetone for approximately 30 minutes.

Thermogram (Urban Sample)



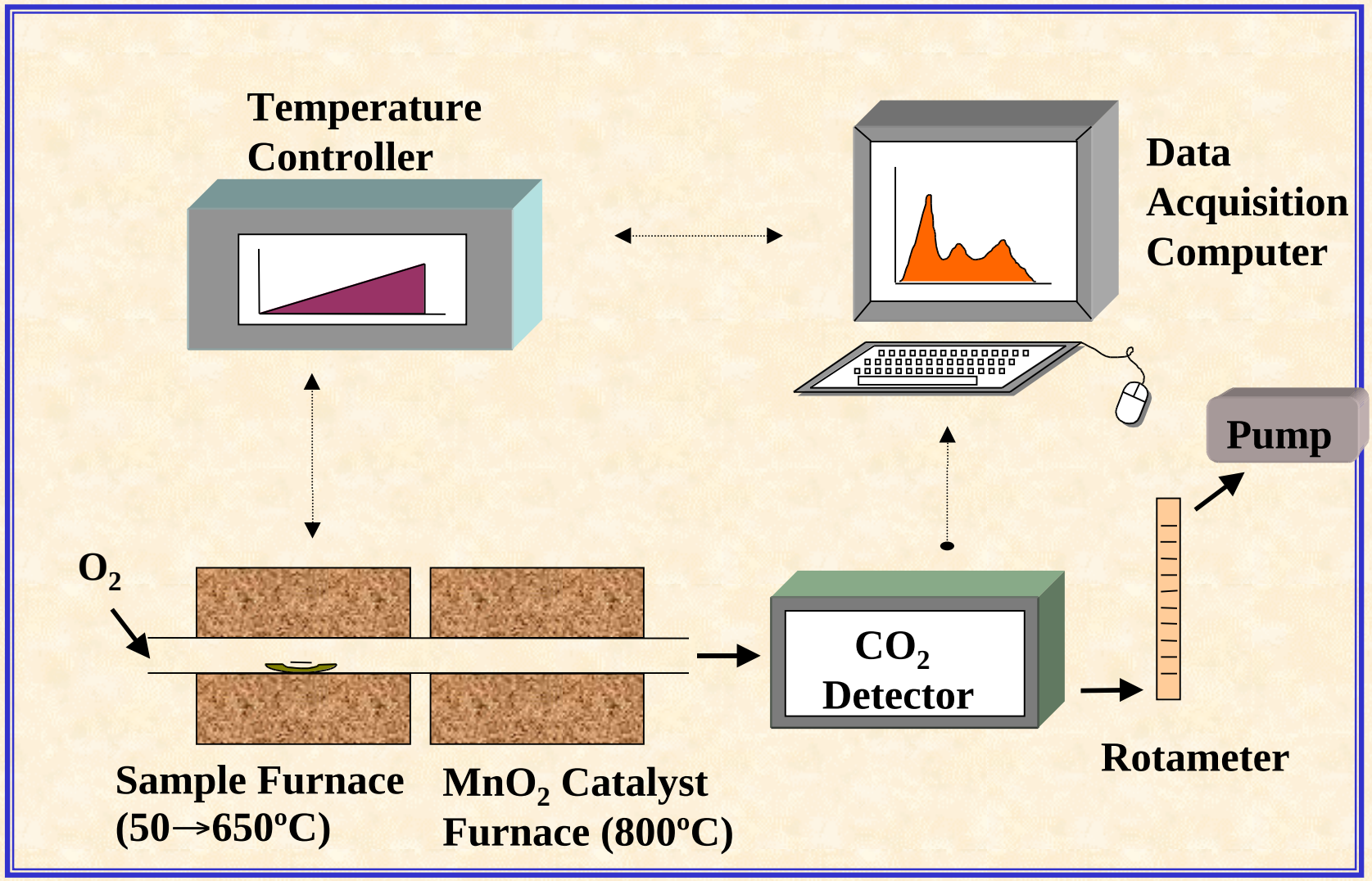
Optical Attenuation (ATN)



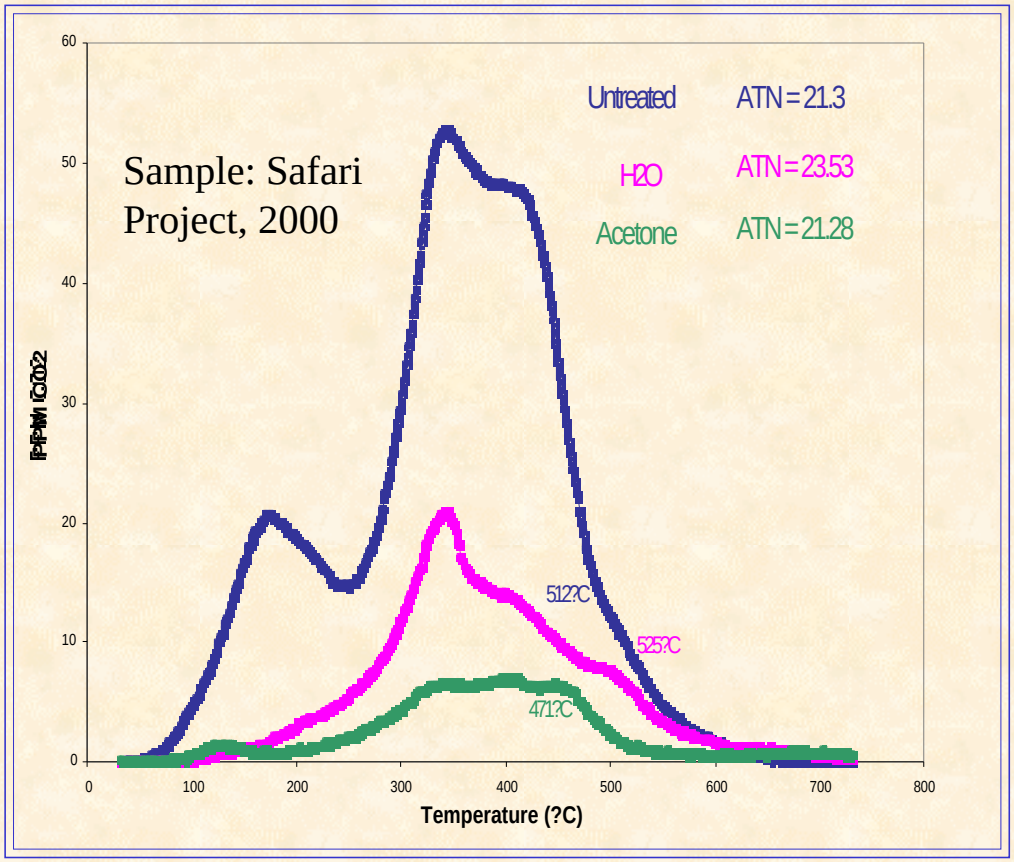
ATN = lnI/$I_{0,}$I is loaded sample; I_o is clean sample

BC = ATN/_, _ is absorption cross section of BC deposited on quartz

Evolved Gas Analyzer

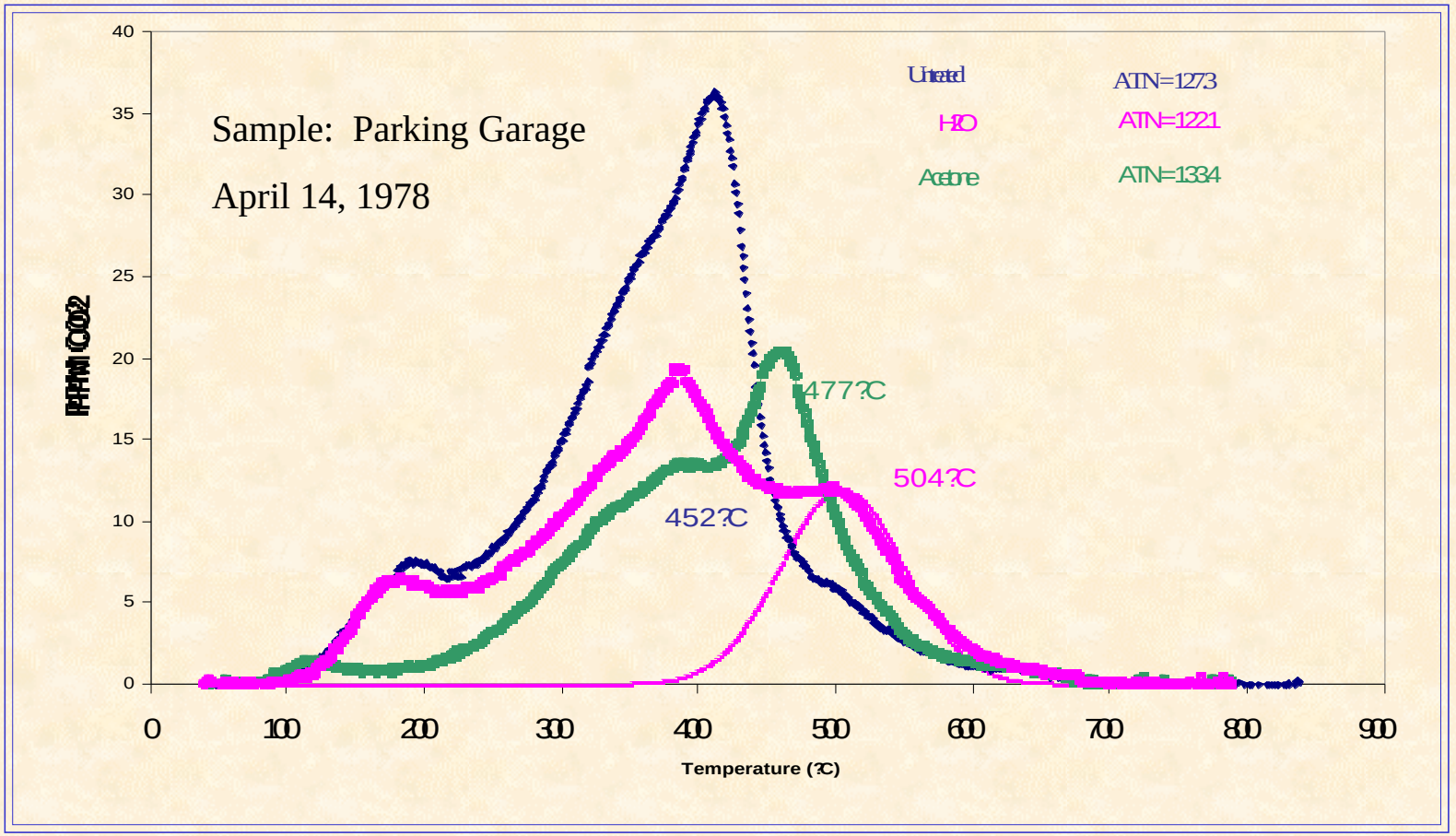


Impact of Extraction on Samples



- The extraction with water removed most of the OC without affecting the BC content.

Impact of Extraction on Samples



SUMMARY

- Because BC is not always well resolved from OC in the thermogram, we used ATN measurements to estimate and locate the BC temperature peak.
- Thermograms of extracted samples showed better-resolved peaks and a shift in BC evolution temperature compared to untreated samples.
- Water and acetone were capable of extracting much (40-50%) of the OC from the sample.

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